Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

280.29
F22F
cop. 3

Vending Milk In Small Containers,

by Cooperatives and Others

LIBRARY
CURRENT RECORD
MAY 3 1957
U. S. DEPARTMENT OF AGRICULTURE

Hughes H. Spurlock
and Donald E. Hirsch

Farmer Cooperative Service
U. S. Department of Agriculture

FCS Circular 20 March 1957

The Farmer Cooperative Service conducts research studies and service activities of assistance to farmers in connection with cooperatives engaged in marketing farm products, purchasing farm supplies, and supplying business services. The work of the Service relates to problems of management, organization, policies, financing, merchandising, product quality, costs, efficiency, and membership.

The Service publishes the results of the studies; confers and advises with officials of farmers' cooperatives; and works with educational agencies, cooperatives, and others in the dissemination of information relating to cooperative principles and practices.

JOSEPH G. KNAPP,
Administrator,
Farmer Cooperative Service,
U. S. Department of Agriculture.

This study was conducted under authority of the Agricultural Marketing Act of 1946 (RMA, Title II).

CONTENTS

	Page
Highlights	iii
Importance of vending	1
Vending may pay	3
New operators attracted	3
Established operators expanding	4
Many operators report net margins	5
Successful merchandising	8
Selecting suitable locations	8
Obtaining suitable locations	11
Selecting containers, prices, and products	13
Selecting machines	14
Testing locations	16
Comparing specialized operators and milk distributors	16
Comparative advantages	16
Operating practices and efficiency	17
Appendix A—nature of the study	21
Purpose	21
Methods and scope	21
Appendix B—statistical tables	23
Selected references	31

For sale by the Superintendent of Documents, U. S. Government Printing Office
Washington 25, D. C. - Price 15 cents

HIGHLIGHTS

THE basic question that managements of cooperatives and other milk distributors ask about vending is this: Does it pay?

To find answers to this question, Farmer Cooperative Service made a special study. This report is based on that study and tells of the experiences of nearly 200 operators vending milk indoors in small containers. It will help other managements decide wisely whether to engage in vending.

Vending is emerging as an important new merchandising technique for fluid milk. Farmer cooperatives—whether their principal activity is distributing packaged products or price bargaining—are vitally concerned because of the prospects for increased consumption of milk. Increased consumption means increased farm incomes.

Two principal kinds of organizations engage in vending milk and milk products. One is the milk distributor, whose principal activity is conventional distribution of milk. The other is the specialized operator whose principal activity is automatic merchandising and who sells nondairy as well as dairy products through vending machines.

About 30 percent of the milk distributors studied were farmer cooperatives; none of the specialized operators were businesses owned and operated by farmers.

Recent expansion and proposed expansion by present operators give some indication of the potential net margins in vending milk. In mid-1955, of every 10 reporting 7 planned to add machines. Only 1 out of every 50 planned to curtail vending. If an answer could be obtained from every operator, it is probable that the picture would be less favorable but still good.

Of 75 milk distributors expressing an opinion, 83 percent said vending sales represented almost entirely new volume.

For the organizations surveyed, the great bulk of sales was in half-pint or third-quart containers at a price of 10 cents a unit.

For fully automatic machines selling half-pints, the average break-even point was 60 units, average sales were 77, and the difference was 17 units a day. Comparable data for semiautomatic machines—and for sales of third-quarts—also indicated rather small net margins from vending.

If each location had been served by a machine suited to the sales volume at that location, 9 of every 10 machines on location more than 30 days would have been within the volume range required to break even or better. In practice this would be difficult to accomplish, however. Therefore, although the actual proportion is unknown, it is something less than 9 of 10.

Many factors affect volume and many problems are involved in obtaining adequate volume. Discussed

in some detail in this report are those concerned with selecting and evaluating possible locations, gaining access to desirable locations, and selecting the optimum size unit, price, combination of products, and type of machine for each location.

Selecting locations expertly is particularly important. A number of useful guides—such as the ratio of customers to machines—are discussed in this report. For example, in industrial locations it appears that 200 persons may be enough to justify locating one fully automatic machine. A considerably smaller number is sufficient for a semiautomatic machine.

Nine of every 10 operators had milk vending machines in industrial plants. Two-thirds of all the machines included in this study were in such plants. Other kinds of locations—such as office buildings, military establishments, and college dormitories—also were used.

There are several ways to persuade a location owner to permit installation of a vending machine. One is to convince him that his business will benefit. Another is to convince employees that they would benefit, and thus should help persuade the location owner to grant permission.

A 10-percent commission on gross sales often is used to influence location owners. A sliding scale—one that increases the rate of commission as sales volume increases—has also been used effectively.

More than 9 of every 10 operators covered in this study used paper containers. The half-pint selling for 10 cents was the most common price-and-carton combination.

Semiautomatic machines require fewer sales than fully automatic to be successful. The latter vend products more rapidly, however, and are preferred where customers demand a large volume within a short time. Of nearly 10,000 machines, more than 6 of every 10 were fully automatic.

A milk distributing cooperative usually has three alternatives with respect to vending: (1) To stay out, (2) to establish its own vending operation, or (3) to arrange with an automatic merchandising firm (or "specialized operator") to vend the association's milk products. Many small cooperatives that decide to sell through vending machines may find it desirable to sell packaged milk to specialized operators. Some large associations may find it desirable to establish vending departments of their own.

There are no infallible tests to determine whether a cooperative should engage in milk vending. Neither are there hard and fast standards to indicate whether sales to a specialized operator would be preferable to establishing a vending department within the milk distributing organization.

This study indicates that many operators vend milk successfully. But it is a difficult and highly specialized form of selling. A cooperative should not engage in vending unless careful study of its market indicates that success may be possible.

Vending Milk in Small Containers,

by Cooperatives and Others

by

Hughes H. Spurlock and Donald E. Hirsch

Dairy Branch

Marketing Division

THIS report provides information that will help managements of cooperative and other milk distributing organizations to make economically sound decisions on whether to engage in vending. It is based on a study made in 1955–56 by the Farmer Cooperative Service. Most of the data and much of the other information were obtained through a nationwide mail survey. Readers desiring to know more about how the study was made may refer to the appendix.

The study sought to obtain current information on several specific aspects of vending. These included:

1. Extent and degree of success being achieved by large numbers of operators located in widespread geographic areas of the country.
2. Current data on average break-even points and daily sales for vending machines.
3. Merchandising practices being used, such as size of unit, type of carton, selling price, and combination of products selected.
4. Types of machines being used, semiautomatic or fully automatic, and kinds of locations selected.
5. Mistakes and pitfalls to be avoided in organizing and operating a milk vending machine business.

The opportunities and problems of milk vending are considered here from the point of view of the individual firm rather than the entire industry. The study is limited also to vending through coin-operated, small-container, indoor machines. This is the most common kind of machine used in this country.

Importance of Vending

VENDING is emerging as an important new merchandising technique for fluid milk. This development means much to milk producers because it may increase total consumption of milk. This in turn may bring higher prices for milk at the farm level.

Vending also is important to distributors, whether or not they are farmer-owned cooperatives. By providing a means for increasing their volume of sales, vending enables them to reduce unit costs in processing and to increase cash receipts of the business. These changes can result in greater net margins for each business operation.

Farmer cooperatives are especially concerned with these opportunities. Members of price bargaining associations benefit from an increase in consumption of milk. Members of milk distributing associations have a similar gain plus the added benefit of an opportunity for increased net margins from their joint marketing operations.

Consumers also have a stake in the vending of milk. Above all, it emphasizes *convenience*. Consumers have greater opportunities to drink milk when and where they want it.

Interest in vending milk is at an all-time high. Large quantities of milk qualified for use in fluid form are being diverted to lower return manufactured dairy products. Any marketing technique that will reduce these surpluses in an economical way is of great interest and value to the entire dairy industry.

Milk vending is not something new, however. It was tried in the 1930's but numerous failures occurred. Since 1949, it has made a comeback and now is well established in many markets.

What are the characteristics of milk vending that make it an attractive method for selling milk? Some of the more important are these:

1. Various studies have shown that spur-of-the-moment impulse buying accounts for a high percentage of retail sales, especially food items; vending machines take advantage of this consumer behavior trait.

2. People need more milk to meet scientifically determined nutritional standards.

3. Milk is widely accepted as a flavorful and relatively inexpensive beverage.

4. Consumers often will buy cold, fresh milk if it is available in a convenient form and at an opportune time and place, even when it is sold in competition with several other beverages.

5. Automatic selling is not a radical departure from the modern self-

Milk is widely accepted as a healthful and relatively inexpensive beverage. Vending machines easily reached by consumers at their places of work add the element of convenience.

service store since only the cashiers' job was eliminated. Vending machines are in keeping with the present trend toward increased mechanization in processing and marketing food.

6. Vending machines have been successful in selling many items other than dairy products; some of these items, especially beverages, are similar in form and handling requirements and competitive with dairy products.

These characteristics show why vending as a method of selling is attractive to managements of many cooperative and other milk distributing businesses. There are many problems and pitfalls, however, to be considered. The rest of this report is concerned with weighing limitations as well as benefits of milk vending.

Vending May Pay

THE basic question about vending asked by managements of cooperatives or other milk distributors is this: Does it pay?

In order to determine whether vending will pay under conditions common in the industry, inquiries were made in a mail questionnaire to determine the situation with respect to entries of new operators, plans of established operators for expansion and the amounts of net margins.

New Operators Attracted

The 6-year period of 1950–55 was an era of rapid growth in milk vending. The data assembled do not show the actual growth of milk vending in the dairy industry from year to year since no information is available on the number of operators who ceased vending during the period. The data indicate how recently present operators began operations.

Of 182 operators reporting, 135—or 3 out of every 4—started in milk vending after January 1, 1950. The peak year was 1954 when 46—or 1 out of every 4—started vending.

Data for 1955 are incomplete since the mailing list for the questionnaires was prepared during the first half of the year.

Appendix table 1 gives further details on expansion in milk vending.

Estimates of the National Automatic Merchandising Association provide another view of developments in milk vending. In a recent report, this organization estimated that the quantity of milk vended increased 75 percent in 1955 over 1954. Significantly, this was the most substantial increase of any vended product, although milk is still far behind many other items in volume of sales.

According to this same source, a total of 22,000 indoor milk vendors sold an estimated $30.8 million worth of milk in 1955, while 2,400 outdoor machines had a sales volume of $8.4 million.

The extent to which milk vending has developed varies considerably between regions, however. Of 86 operators whose principal activity was conventional distribution of milk and who reported to the Farmer Cooperative Service on their operations in August 1955, nearly two-fifths were in the Middle Atlantic region. Nearly one-half of the vending machines operated by these distributors were in that region. One of every 4 fully automatic machines was in the East North Central region, whereas the semi-automatic machines were numerous in the West North Central region.

The situation was much different for 96 specialized operators whose principal activity was automatic merchandising. One-third of these operators and more than one-half of their machines were in the East North Central region. The Middle Atlantic region had the next largest numbers of operators and machines.

Appendix table 2 gives further details on the regional locations of vending machines and operators.

In summary, most of the present operators of milk vending machines entered that business since 1950. Of 182 operators reporting to the Farmer Cooperative Service in late 1955, more than one-half were in the Middle Atlantic and East North Central regions. They operated 2 of every 3 milk vending machines in this country.

Established Operators Expanding

What about operators who have been in milk vending for several months or years? Do they plan to expand or contract operations? Answers to these questions should give some indication as to whether it pays to vend milk. It would not be logical for an operator to buy additional machines unless all or most of the ones he owned were successful.

Data assembled in this study show that each group of operators who began milk vending during recent years planned to have far more machines in use by the end of 1955 than they had during their first years of operation. This indicates that many operators who were in the milk vending business in August 1955 had found it a rewarding enterprise.

An unknown (but presumably much smaller) number of operators had found vending unrewarding and had gone out of the business.

Reports from the industry indicate that few operators went out of the business in 1954. Under such conditions, operators' plans for 1955 become highly significant.

A great majority of the 160 operators who began vending before 1955, and who were still active in August 1955, planned to expand their vending operations. Seven out of every 10 planned to add machines while less than 1 out of every 50 planned to curtail vending.

If plans materialized, a total of 2,578 machines, or an average of 21 for each operator, were added in 1955. Of course, there was wide variation in the number of machines each operator planned to add. Some indicated they were planning to add only 1 or 2 machines, while others planned much greater increases.

Of the operators not planning an increase, 22 will make no change, 5 were uncertain, 12 did not express their intentions, and 3 planned either a reduction or to go out of the business entirely. These reductions involved only 63 machines, however. The reasons given for them were: Some locations did not pay, difficulties with labor unions existed, and gross margins were insufficient for successful operation. After deducting the indicated decrease of 63 from the expected increase of 2,578 in 1955, the total expected net gain was 2,515 machines—a gain of more than 33 percent. (The National Automatic Merchandising Association estimated an increase for the year 1955 of 37.5 percent.)

Appendix table 3 gives further information on operators' plans for 1955.

Since these figures for the end of 1955 were estimates, it is of interest to see how far those reporting an expected increase had gone toward reaching the goal at the time the questionnaires were completed in August 1955. At that time, the 118 operators reporting an expected increase were operating 1,455 more machines than they operated in 1954. Thus, 56 percent of the 2,578—the indicated increase for the year—had been attained, but well over half of the year had elapsed.

The common practice seems to be for a beginner to start with only a few milk vending machines and then add additional units as experience and confidence are gained. If the business is to grow, the machines have to demonstrate their ability to make net margins and add to the total sales volume.

In answer to a question on owners' experiences and attitudes toward vending, operators were for the most part optimistic about future developments.

Nine of every 10 of the 180 operators responding expressed confidence that vending would continue to grow in their market areas. Only 1 of every 10 thought that it would not.

Similarly, most milk distributors—operators whose principal activity was conventional distribution of milk—expressed the opinion that vending sales were almost entirely in addition to sales through their conventional outlets. Of the 75 milk distributors expressing an opinion, 83 percent said that vending sales represented almost entirely new volume, while 17 percent said these sales were partly additional and partly displacements of conventional sales.

Many Operators Report Net Margins

Each operator in the survey selected his most important size of package and his selling price, then listed the number of units a fully automatic and a semiautomatic machine must sell per operating day to break even (that is, to have costs and revenues equal and no net margin or loss).

Also, each operator listed the average number of units his fully automatic and semiautomatic machines sold per operating day. The average numbers of units that small operators reported showed such wide variation that all averages were weighted by the number of machines reported. The difference between the break-even point and the weighted average of sales per operating day affords a rough guide as to the success, or lack of success, of the vending operations.

Both the number of units required to break even and the number of units machines sold per operating day very likely were estimated by the operators. However, the figures given may not be greatly different from those complete cost accounting systems would provide. Many operators are still evaluating their machines as a method of merchandising and watch closely the income and expense of each machine to determine whether or not selected locations show a net margin.

Average Volumes and Break-Even Points

Data gathered during the study show the average break-even point, average number of units sold each operating day, and average number of units by which current sales exceeded the break-even point. Information is shown separately for organizations whose most important unit was the third-quart selling for 10 cents and organizations whose most important unit was the half-pint selling for 10 cents. Few organizations sold other units or sold these units at other prices.

Data are shown for both the fully automatic and the semiautomatic machines. However, in many cases, an operator owned both types of machines.

For each unit, kind of machine, and type of sales organization, current average sales were well above the break-even points. For example, 78 operators used fully automatic machines to sell half-pints of milk. The break-even point was 60, average daily sales were 77, and the difference between them was 17 units a day.

This difference between break-even point and sales volume indicates a

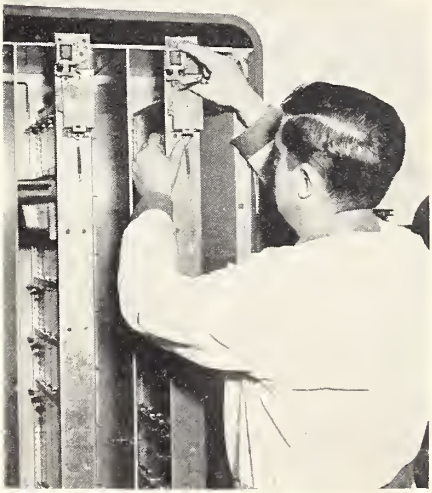
These teen-agers apparently think the milk-vending machine is a good place to stop for a refreshing drink between classes.

rather small net margin as a rate of return on investment or sales. To illustrate: The resale price of a half-pint usually was 10 cents. If it cost 7 cents (no information on this cost was obtained by questionnaire), the spread or operating margin would be 3 cents. The gross saving from an average machine then would be 51 cents daily (3 cents on each of 17 units). If the machine operated 6 days a week for 50 weeks during each year, total annual gross saving would be about $150. From this amount would be deducted the "variable" costs of servicing and repairing the machine that would result from handling the units in excess of the number needed to break even.

The average fully automatic machine sells substantially more units per operating day than a semiautomatic machine, regardless of whether half-pints or third-quarts are handled.

Furthermore, operators who used fully automatic machines and sold third-quart size containers averaged 92 units a day; operators who sold the smaller half-pint units averaged only 77 units a day. With an indicated break-even point of 65 and 60 units respectively, and sales exceeding those points by 27 and 17 units, the third-quart appeared to be more rewarding. This may have been due, in part, to more fortunate choices of locations. Furthermore, this relationship did not exist for the semiautomatic machines. There was no significant difference among the latter machines in their volumes of half-pints and third-quarts.

Appendix table 4 gives further information on sales volumes and break-even points.



Milk-vending machines must be kept in good condition to maintain sales volume and customer good will.

Variations in Volumes and Break-Even Points

Thus far this report has dealt mostly with industry-wide averages. But such averages do not indicate differences between individual operators.

Operators' Sales Volumes.—Information was obtained to show the distribution of unit sales volumes for machines maintained by the individual operators.

Differences between fully automatic and semiautomatic machines were greater than between half-pint and third-quart units. Two-thirds of the operators with fully automatic machines handling half-pints reported their machines averaged between 60 and 120 units daily. Four-fifths of the operators with semiautomatic machines handling that size of package reported that they averaged less than 60 units daily.

Eight of each 10 operators with fully automatic machines handling third-quarts reported that their machines averaged 80 units a day or more. Eight of each 10 with semiautomatic machines reported average daily sales volumes of less than 80 units per machine.

Differences in number of machines operated, in types of locations served, and in skill of operators may bring varying sales results for each concern and also differing results between groups of concerns that are similar in these respects. For example, concerns with good location, other things being equal, will have higher sales averages.

Many small operators were in either the highest or the lowest average ranges in sales volume. Those with low sales apparently had not been successful in establishing their machines in good locations, lacked the kind of organization needed for best results, or perhaps could not find suitable locations. Where small operators had extremely high volumes, it appeared that locations might have been very carefully selected and only the best ones served.

Large operators showed a pattern more consistent with the group average, indicating they had some good and some poor locations.

Appendix table 5 contains additional information on operators' sales volumes.

Operators' Break-Even Points.—The operators reported a rather wide distribution of break-even points for their machines. Semiautomatic machines had much lower break-even points than fully automatic machines. The break-even points for both kinds of machines handling third-quarts were somewhat higher than for those vending half-pints.

While there was a somewhat wider range shown in unit sales (Appendix table 5) than in reported break-even points, the latter still was rather surprisingly wide (Appendix table 6). No two operators had identical costs, but more uniformity existed than the data show. It is probable that many of the extreme low and high break-even points represented inaccurate estimates by operators.

This points up (1) the need for careful cost comparisons between operators and for single operators during sufficient periods of time, and (2) the fact that considerable variation in break-even points exists because of the influence of the many factors affecting costs. Industry-wide or other averages can be used only as guides, not as specific objectives for any individual firm.

Of the 112 operators for whom data are given, 90 reported they were making overall gains on their vending operations and 22 reported they were not. Of the latter, 7 milk distributors (operators whose principal activity was conventional distribution of milk) and 4 specialized operators (whose principal activity was automatic merchandising) said they actually were losing money. However, only 2 of these 11 planned to cease vending.

Appendix table 6 gives further information on break-even points.

Machines' Sales Volumes.—To get a better idea of how much milk individual vending machines sell, each operator indicated the percentage of his machines which had average daily sales falling within each of several specified volume ranges. These percentages were converted to numbers of machines.

The data are for both fully automatic and semiautomatic machines and no distinction is made between sizes of unit. The data, therefore, are a composite of reports from 135 operators who reported on 5,784 machines. Of these 135, only 4 reported that all of their machines averaged fewer than 30 units a day. None of these operators had more than 3 machines.

At the other extreme of the sales volume range, 4 operators reported average sales of more than 150 units a day for all of their machines. These concerns operated 15 or fewer machines.

More than half of the nearly 6,000 machines had average daily sales of from 30 to 90 units. Nearly three-fourths sold from 30 to 120 units each operating day.

Appendix table 7 gives additional details on the machines' sales volumes.

In conclusion, about 90 percent of nearly 6,000 machines that had been on location more than 30 days would have had sales volumes large enough to make a net margin if all low sales volumes had been handled by semiautomatic machines. Of the sales volumes, 30 percent were large enough to be profitable for semiautomatic machines only, while 60 percent were adequate for either the semiautomatic or fully automatic machines.

The number of machines that actually were successful was, of course, less than these percentage figures indicate. Many factors affect net margins and many problems are involved in obtaining adequate volume.

Successful Merchandising

ORGANIZING and operating a milk vending business is a specialized operation. Experienced operators caution that success depends on expert handling of organizational and operational problems. Many of these problems require patient application of detailed knowledge. If ignored, they may cause serious losses. To build an organization capable of meeting the exacting requirements of the vending business it is advisable, where size of operation will permit, for milk distributors to establish a special department that can devote the necessary time and effort to vending.

Established, specialized vending machine operators who have already acquired a basic understanding of automatic merchandising methods often can handle milk without much difficulty. But each specialized operator or milk distributor must:

1. Select and evaluate possible locations
2. Gain access to desirable locations
3. Select the best size unit, price, combination of products, and type of machine for each location
4. Arrange a service schedule for the machines
5. Select, train and utilize route labor efficiently.

The first three of these requirements are discussed in this section of this report. The other two are not included in this study but are of such basic importance that vending organizations should make an intensive study of them.

Selecting Suitable Locations

Like many another retail business—whether it be a grocery store, gasoline station, or road-side fruit and vegetable stand—a milk vending business must have its sales facilities conveniently located for a sufficient number of customers. Potentially good locations, in a relatively small area so servicing costs do not become excessive, are the prime requisite for building and maintaining a successful vending business. Therefore, anyone contemplating going into vending should make a careful survey of the intended market area to determine whether or not such locations exist. Once the available locations are known, the amount of travel and other expenses required to service and maintain machines should be estimated.

Together, these two factors—locations and servicing costs—will largely determine whether or not a vending business should be undertaken. Thus, the importance of making a preliminary market survey study is readily apparent. Knowing the facts can serve either to prevent an unsuccessful entry into vending where conditions are unfavorable, or to justify a decision to enter where conditions are favorable.

Guides

Determining the sales potential of a location in advance of placing a machine indicates the chances for a successful operation. Precise procedures for such evaluations have not been developed. Even though operators often face the problem, both in beginning a new route or eliminating unsuccessful locations by moving machines that are not breaking even, there is still much uncertainty with respect to estimating the potential sales volumes in a given location. In fact, about 7 out of each 10 milk distributors reported they were not able to

estimate closely the sales potential of a location. Specialized vending machine operators, being more familiar with automatic merchandising generally and more experienced in selecting locations for such machines, were more confident of their ability. But nearly 6 out of each 10 reporting said they too could not estimate closely the sales potential of a location before placing a machine.

While vending machines can be moved with little difficulty, the reason for keeping moving to a minimum is apparent. A machine used to test a location that will never be successful incurs losses that must either be absorbed by gains from other locations or be met by using other funds. Therefore, even though some mistakes are inevitable, it is essential to screen all locations carefully before placing a test machine. This screening is aided by judging each potential location according to several factors that influence sales. These factors are:

1. Ratio of Customers to Machines.—This guide is useful where the number of potential customers can be ascertained fairly exactly. Operators do not agree exactly on what the ratios should be for either the fully automatic or semiautomatic machine. The figure most commonly mentioned for the fully automatic machine in industrial locations is 200 persons. This is enough to enable the machine to break even or show a small net margin. For the semiautomatic machine, with its lower original cost and operating costs, the minimum number of customers for each machine usually can be considerably lower than 200.

Some of the more common guides in use for placing semiautomatic machines are: Locations with fewer than 200 people, industrial plants with fewer than 150 employees, industrial plants with fewer than 100 employees, or industrial locations with fewer than 75 employees. These variations in answer point up the fact that numbers of potential customers are not the sole factor determining a gain or loss.

2. Kind of Work or Activity.—Whether potential customers perform manual labor, office work, military duties or study, travel, or engage in recreational pursuits weighs heavily in determining a location's sales potential. This is because people doing manual labor consume more milk than those doing nonmanual labor. Employees engaged in heavy, strenuous work in industrial plants are, as a group, the heaviest consumers of milk. Consumption of milk is higher still for employees working in places with high temperatures. Also, where fumes and smoke are a problem, milk may be in strong demand as a health safeguard.

3. Level of Customers' Purchasing Power.—Although demand for some goods and services is more sensitive to changes in consumers' incomes than for others, demand is always important. Purchasing power has been generally credited as an important reason—in addition to strenuous physical activities—for the fact that industrial workers doing heavy manual labor are large milk consumers.

One operator reported that he had found low purchasing power an insurmountable barrier in his school locations. The reason was that students in this particular area could not pay a large enough price for the operator to make a net margin. This is not the case, however, in many other schools.

Another operator credited low income with making an otherwise unpromising location a very good sales outlet. This was contrary to the common belief that strong purchasing power brings increased sales. In this instance, a number of women working in offices received relatively low wages but per capita consumption of milk was high. The operator reasoned that employees saved on lunch expenses by bringing a sandwich from home and purchasing a carton of cold milk at the office.

4. Availability of Suitable Location Space.—The effectiveness of vending machines as a method of selling milk is based in part on impulse or spur-of-the-moment buying. Consequently,

the machines must be placed where they will attract the interest of customers. This is accomplished by placing machines conspicuously in areas where potential customers congregate or pass regularly. Preferably, the machine should be placed so it constantly reminds customers of its product and is convenient for them to purchase and consume the product.

Problems arise in finding the locations best suited to vending. Suitable space may not be available at all, or electrical outlets may not be at hand, or location owners may not grant permission to install machines. Usually, however, promotional devices at the point of sale can be used to increase sales through the machines at both poor and good locations. These may be lighted pieces of equipment or any materials that will catch the consumer's eye and acquaint him with the fact that delicious, fresh milk is available. A machine with distinguishing colors may be a means of attracting attention and creating an impression favorable for making a sale.

5. *Time Customers Can Visit the Machines.*—Time is important, for obviously employees cannot buy many units unless they have adequate opportunities to visit the machine. Also, there is a limit to the convenience of machines in a plant where operations are widely scattered. The policy followed by management concerning time allowed for lunch, work breaks, and relief of workers attending machines, and the general policy toward use of time are highly important.

In taking into account the time factor, fully automatic machines often are placed to give speedy service during rush periods. If conditions warrant, more than one machine may be placed at a single location. Also, in plants where operations are widely scattered semiautomatic machines may be used to service isolated groups of employees who are unable to patronize a more centrally located machine. A second time factor is the number of shifts worked in an industrial location. The advantages of having machines operate a large part of the 24-hour day are obvious, but this also creates a supply problem, which may require special arrangements for servicing.

6. *Competitive Conditions.* — Milk sold through vending machines competes with other refreshing drinks and with milk sold over the counter at nearby restaurants.

Experience has shown that dairy products can compete successfully with other beverages. Milk sold through other kinds of outlets usually does not present a serious problem for vending. Vending's claim to a place in the milk distribution process rests in part on its ability (1) to capture some of the revenue now going to vendors of products other than dairy, and (2) to sell milk at times when other outlets are closed.

For the individual firm engaged in vending milk, consideration must be given to competition from other firms in the same kind of business.

7. *Lunch Facilities for Workers.*—In locations where workers bring their lunches, vending may increase consumption of milk. Milk may not otherwise be available. Keeping milk brought from home presents a problem in refrigeration. Some employees may forego use of milk if there is no vending machine.

8. *Race and Nationality of Customers.*—As a group, white people drink more milk per capita than Negroes. Similarly, individuals of Northern and Western European extraction may consume larger quantities of milk than people who are descendants of people from Southern Europe. In some geographic areas and in certain industries, these considerations may have some bearing on decisions regarding vending.

9. *Ratio of Men to Women Among Customers.*—Many women are concerned about the possibility of adding weight as a result of drinking whole milk. This leads to lower average consumption. Men usually are less weight conscious and often drink more milk.

Some of these considerations are

more fundamental than others. The most important guides are these: Ratio of customers to machines, level of customers' purchasing power, availability of suitable location space, and kind of work or activity.

The guides are useful in determining where to expand operations as well as in deciding whether to go into vending. If there are few new locations that qualify according to these guides, the opportunities for expanding vending successfully are extremely limited.

Locations Used

Vending machine operators may be guided by the experience of others as well as by evaluating the locations existing in their own markets.

Nine of every 10 operators had vending machines in industrial plants. Two-thirds of all the machines were in such locations.

Office buildings were the next most popular kind of location. Nearly 4 of every 10 operators had machines in such buildings. And more than 10 percent of the total number of machines were located there.

Other common kinds of locations are military establishments, college classrooms and dormitories, high schools, grade schools, transportation terminals, department stores, and hospitals. The relative importance of each is indicated by data in appendix table 8.

Obtaining Suitable Locations

Selecting suitable locations is the first step, but it is useless unless permission can be obtained to place machines there. This is not always easy and in some cases it is not possible. In most cases it is a challenging problem in human relations and one that requires constructive planning and handling.

Some location owners believe vending machines will reduce the operating efficiency of their principal businesses. They fear the machines will cause confusion and disruption of work by enticing workers away from places where they are critically needed. Other location owners believe the machines may cause unsightly and unsanitary conditions. Some believe the ma-

Industrial plants have more vending machines than any other kind of location. More semi-automatic machines are found in plant locations than elsewhere.

chines are likely to be inefficient and a source of trouble because of interrupted service.

Further, management may object to vending service personnel coming in and out of a work area. They may take the attitude that existing milk supply services are adequate.

Persuading Location Owners

The basic task of the vending machine operator is to dispel any fears that the location owner may have concerning problems the machines might create, and to persuade him that his business will benefit from the vending service. If possible, he should be convinced that his employees will work more efficiently, loss of time or loafing will not be a problem, the machines will be expertly and continuously serviced, and the premises will be kept clean. This is a selling job.

Another approach is to convince employees and their leaders that vending machines will benefit them. This can enlist their influence in locating the machines. It may be handled with a labor union or with some other organized group of employees.

If potential customers can be convinced that milk is nutritious, flavorful, and economical, the door may be opened to milk vending machines. A few operators have used this approach so convincingly that they have obtained use of locations without charge. Usually, however, the operator pays the owner for use of the location.

Paying Commissions

Revenue from space released for vending may be valued highly. A large industrial concern may almost disregard it but a school or YMCA may find it useful as a supplement to limited funds for operations. In either case, however, the location owner usually insists on payment for the space used.

Paying commissions into employees' welfare or recreational funds may benefit both an industrial concern and a vending machine operator. The former has more satisfied employees and the latter may have reduced losses from theft and vandalism.

Student organizations, particularly in high schools, may find milk vending machines a source of funds for their group activities.

Whether in plant, office, school, military base or elsewhere, direct benefits to customers—in terms of commissions paid to them as organized groups—help increase sales through vending machines.

The amount of money paid varies greatly. Different methods of computing payments also are used. The most common methods are (1) a fixed percentage of gross sales, and (2) a sliding scale of payments keyed to volume of sales. Only one operator paid a fixed monthly rental.

Fixed Percentage of Gross Sales.—Commissions range from zero to 20 percent of gross sales with 10 percent being the most widely used.

Among those paying a greater or smaller fixed commission than 10 percent, those paying 5 percent were most numerous. One out of every six operators paid this amount. The proportion of operators paying 5 percent was about the same for milk distributors as for specialized operators.

There were a few instances where some other fixed percentage was paid. Competition for these outlets seemed to be greater. Commissions were high at some military posts.

One operator reported that he paid whatever competition forced him to pay. Several others said they paid commissions only where absolutely necessary.

Sliding Scale of Payments.—One of every 4 milk distributors and 1 of every 3 specialized operators used a "sliding scale" to calculate rebates or commissions. Under this method, the rate of commission paid increases with sales volume. It usually has the advantage of not obligating an operator to pay a commission unless the sales volume reaches a successful level.

There is no fixed amount or pattern established for sliding scales. Locations differ as to sales potential, com-

petition is not the same in every area, and amounts of operating margins from which operators pay commissions are not the same. These differences affect the rates established. Then, too, operators are able to bargain more effectively with some location owners than with others.

Some sliding scales are based on the number of units sold. One operator paid no commission on a machine selling fewer than 1,500 units per month, 5 percent of gross sales if the sales volume was 1,500 to 2,500 units, and 10 percent if volume exceeded 2,500 units. Another operator paid 5 percent on less than 100 units of sales per operating day and 10 percent on 100 or more units. This operator thus was paying a commission on all machines regardless of whether they were breaking even.

In some instances the schedule of payments was based on dollar volume of sales a month. For example, $200 and over a month—10 percent commission; $140 to $200 a month—5 percent. In some cases operators reported that they deducted from these rebates or commissions any shortages occurring during the month.

Appendix table 9 gives further details on location payments.

Selecting Containers, Prices, and Products

Selecting size of unit, retail price, combination of products, type of carton, and kind of machine poses problems for every vending operator. Much of the previous research on milk vending machines has dealt with some or all of these aspects of vending. Results of those studies appear in the published references listed at the end of this report.

The study on which this report is based provided the following information on operators' practices:

1. *Type of Carton.*—More than 9 of every 10 operators (92 percent) used paper cartons in preference to glass bottles. Operators frequently object to glass on the basis that bottles become scattered so that recovery is a problem, and they break and cause an unsightly and dangerous litter about the machines, resulting in higher operating costs. By using paper cartons, a clean, orderly appearance can be more easily maintained. The operator simply provides a closed receptacle into which empty cartons are dropped. However, it should be noted that these statements are merely the expressed opinions of certain operators; this study did not involve a comparative analysis of glass containers and paper containers.

Over one-fourth of the operators covered in this study sold third-quart cartons of milk at 10 cents each.

2. *Size of Carton and Selling Price.*—The half-pint selling for 10 cents was by far the most common carton and price combination. Of the 177 operators reporting both price and size of carton, nearly 6 of every 10 listed this combination as their most important. One of 4 listed the third-quart selling for 10 cents, and 1 of every 10 specialized in selling pints for 15 cents. Altogether, these three price and unit combinations represented standard practices for 93 percent of all operators reporting. Many

of these operators vended more than one size unit but the data did not show how extensively this was practiced. Appendix table 10 gives further information on this subject.

3. *Combination of Products.*—All of the operators covered in this study sold both regular milk (usually homogenized) and chocolate milk. Other research studies indicate that these two products together will sell considerably more milk than either can alone. Usually, chocolate milk outsells plain milk whether or not it is homogenized. But the volume ratios vary at different types of locations. Where youngsters predominate, chocolate milk is a strong favorite. Adult workers who consume milk with their lunch often prefer plain milk.

This study showed that 1 of every 5 operators offered buttermilk in addition to regular and chocolate milk. An almost equally large proportion added orange drink to these two products. One of every 4 added both buttermilk and orange drink. Thus, 2 of every 3 operators had at least one major product in addition to regular and chocolate milk.

A few operators added additional specialities to attain greater variety. These included strawberry-flavored milk, coffee-flavored milk, lemonade, limeade, grapefruit juice, and tomato cocktail. The selection of such specialities varied seasonally.

Opinions differ on the advisability of offering several choices to the customer. Some say he will be more likely to find something he likes, and, consequently, may be more likely to make a purchase. On the other hand, several choices may only confuse him, make it difficult to select one product, and cause him to block access to the machine during a rush period. Further, a machine vending several products creates greater servicing problems. These difficulties must be weighed against the advantages of offering more choices.

The best combination of products for a particular location can be finally determined after the machine is on location. The periods when customers patronize the machine also can be determined so servicing schedules or other arrangements can be planned to keep the machines filled, clean, and operating at all times.

Selecting Machines

No effort was made in this study to determine the relative advantages and disadvantages of the various vending machines on the market. There are numerous makes and models. Each operator must select the machines best suited to his needs.

Findings of this study warrant some comments on the fully automatic and semiautomatic machines. The semiautomatic requires fewer sales to be successful and can operate where the more expensive fully automatic would not be economical. The latter, however, can vend products more rapidly and thus is preferred where customers demand a large volume within a short time. Fully automatic machines serving third-quarts often are given choice locations. Their rather high average daily sales reflect this location advantage.

Semiautomatic machines, on the other hand, are kept by many concerns to serve locations with volumes too low to justify use of the more expensive fully automatic machines.

Semiautomatic machines are often placed in offices, filling stations, and other places where the consumer does not place much value on quantities of milk in addition to the half-pint. This has particular application in locations where a significant part of the customers are women who are conscious of a need to control weight by keeping down calorie intake. But, whether men or women, most people doing light physical work are not likely to want more than a half-pint.

Persons interviewed who had experience with selecting and maintaining machines emphasized the importance of having machines that could be kept operating at all times. Frequent breakdowns can easily become a

Semiautomatic machines such as this are less expensive than fully automatic ones and so do not require as much sales volume to break even. But they cannot vend milk as rapidly.

major difficulty. Machines out of operation not only lose current sales, but they also destroy the confidence of customers and thereby reduce future sales.

Several operators cited the importance of keeping machines operating in order to reduce vandalism. Much of the damage inflicted on machines appears to result from dissatisfaction caused by operating failures. When the customer gets neither the product nor his money back, he may become outraged, feel he has been cheated, and take his spite out on the machine. One of every four operators reporting said vandalism was a serious problem.

What are some of the characteristics to look for in selecting a vending machine? If a machine meets the following requirements it should be satisfactory:

1. Meets the demands of the location to be served, considering the number of people and amount of time available to serve them.

2. Meets the sanitation requirements prescribed by the local board of health. This is not likely to be a major problem, as the machines have been designed to meet such specifications, but health standards vary among cities and States.

3. Permits cleaning of interior and exterior parts with a minimum of time and difficulty. Cleanliness and sanitation must be rigidly maintained. This accounts for much of the labor involved in vending milk.

4. Facilitates servicing and operating by affording adequate storage space to meet needs at large-volume locations, by being relatively free of operational "bugs" and by having mechanical and electrical parts so arranged that they are accessible when repairs are required. Simple, rugged construction is desirable.

5. Has "eye appeal" in order to attract customers.

6. Makes change for customers effectively.

7. Provides simple, easy to understand instructions on how to operate the machine.

8. Is reasonably priced so that fixed

costs do not become prohibitive for locations with moderate to low volumes.

9. Is made by a reputable manufacturer.

These are some of the things to look for in a machine, but not all of these desirable characteristics may be available in one make or model.

Information obtained during this study showed the kinds of machines being used in various locations. The data showed where fully automatic and semiautomatic machines were operating, the ratio of fully automatic to semiautomatic machines at each kind of location, and the kind of operators involved.

Of nearly 10,000 machines, about 6 of every 10 were fully automatic. Most of the machines were in industrial plants and there the semiautomatic machines were relatively more popular than at other locations.

Of 155 operators with vending machines in industrial plants, 1 of every 3 had both fully automatic and semiautomatic machines in use. At other kinds of locations, rather few operators had both kinds of machines.

Appendix table 11 gives additional details on kinds of machines used in the different locations.

Testing Locations

Since locations cannot be finally evaluated except by actual test, the question arises as to how long a machine not providing a net margin should be left at that location. Leaving the machine in one place too long results in further losses but moving it too soon results in permanent loss of a potentially successful location.

There is wide difference of opinion among operators as to how many days are required to test a location adequately. Their answers during this study ranged from 7 to 180 days. The most common number was 30 days. About one-third of the milk distributors and nearly half the specialized operators gave this figure.

Comparing Specialized Operators and Milk Distributors

PRODUCERS would of course benefit most from vending if every suitable location were served by a machine. Total consumption of milk and dairy products would be increased. Moreover, the increase would be in Class I sales, the use-class returning the highest price to producers. As a result, farm incomes would be increased.

Many cooperatives, however, cannot move directly into vending. Bargaining associations usually do not have milk distributing facilities and therefore cannot supply milk to vending machines. Such associations can encourage specialized vending machine operators and local milk distributing firms to engage in vending wherever practicable.

A milk distributing cooperative usually has three alternatives with respect to vending: (1) To stay out, (2) to establish its own vending operation, or (3) to arrange with an automatic merchandising firm to vend the association's milk products. Sometimes the choice is easy; often it is difficult.

This section of the report provides a comparison of vending by milk distributors with that by specialized operators. It can help managements of milk distributing cooperatives choose between the alternatives listed above.

Comparative Advantages

Local conditions are of prime importance when management of a milk distributing cooperative decides whether to vend milk or to sell to an operator specializing in automatic

merchandising. Certain general relationships may help in reaching the decision.

Vending by Distributors

The advantages for the milk distributing organization in establishing its own vending operation may be summarized as follows:

1. The distributor retains control over the quality and handling of his products sold under his own brand. Included under handling are selection of locations, products, prices, and employees to service the machines.

2. Any net margins in vending go to the distributor rather than to someone else.

3. If all other things are equal—and this is a big *if*—the balance may tip in favor of vending by the milk distributor. He already has an incentive to increase sales of milk for fluid consumption because this brings a relatively high return to his producers. Members of producers' cooperatives may benefit greatly.

Increased volumes of sales also lead to lower processing costs in the distributor's plant. They may lead to lower delivery costs on routes if the relatively unsuccessful locations are not isolated from the other locations. Specialized operators logically are concerned with the net margins they may make from vending milk, rather than the total quantity of milk that may be sold.

4. When an adequate volume of business is developed at a sales location, it is controlled by the distributor and cannot be transferred to a competitor by any other person. Four of every 10 specialized operators buy milk from more than 1 distributor; others use their ability to buy elsewhere in price bargaining with the distributors supplying their machines.

5. Payments for milk vended are all cash; there is no credit problem.

6. Vending offers opportunities for effective advertising; the distributor may be able to capitalize on these best if he owns and operates the vending machines.

Vending by Specialized Operators

The advantages for the milk distributing organization of selling finished products to specialized operators for sale through vending machines may be summarized as follows:

1. The problems of purchasing, placing, supplying, repairing, and protecting machines confront the specialized operator and not the distributor who processes and packages the milk. Similarly, the specialized operator assumes responsibility for selecting products, prices, and employees and for properly handling the products. Since he has almost always had previous experience in automatic merchandising, and has necessary facilities and a trained staff, the specialized operator usually can meet these problems with less difficulty and effort than a milk distributor.

2. The margin for vending milk may be narrowed if service costs at each stop can be shared with other products in other vending machines. If there are operating losses on milk vended, the distributor does not suffer them—at least in a short period.

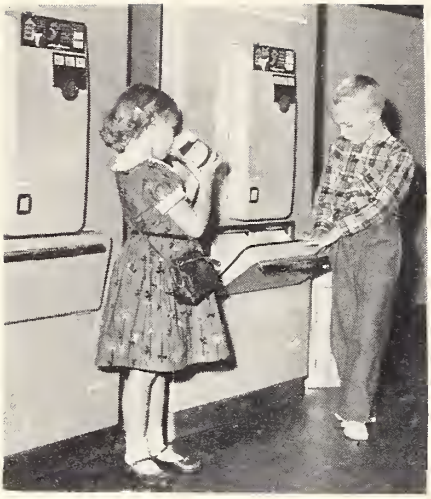
3. Additional locations may be available to specialized operators with other products already being vended there. Plant managements often prefer to have a single firm service all vending machines on its property. Milk distributors—particularly cooperatives—usually do not wish to try to establish a varied line of all the nondairy products adapted to vending.

Operating Practices and Efficiency

More specific information on the operating practices and efficiency of milk vending organizations will help cooperative managements appraise their relative advantages and disadvantages more precisely.

Practices

More similarities than differences exist in operating practices of milk distributors and specialized operators. But the differences are important.



Public schools are not as good locations for vending machines as some others since milk is a regular part of most school lunches. Yet a sizable number of children like a carton of milk as a between-meal snack.

Some of the points of comparison are these:

1. *Processing and Packaging Milk.*—Milk distributors process and package all milk they vend. Specialized operators process none of the milk they vend.

2. *Owning Machines.*—Both milk distributors and specialized operators own nearly all of the machines they operate. Then, too, they operate nearly all the machines they own. However, milk distributors have nearly as many semiautomatic as fully automatic machines, whereas 2 of every 3 machines maintained by specialized operators are fully automatic.

3. *Supplying Milk to Machines.*—Each distributor supplies all the milk to the machines he operates. Distributors also supply milk to two-thirds of the specialized operators. One of every three specialized operators obtains the milk at a distributor's plant or wholesale distribution point and delivers it to his machines in his own trucks.

Most practices concerned with maintaining machines and collecting receipts vary little between distributors and specialized operators. The latter, however, often combine service of milk machines with service of other types of vending machines at a single stop.

Efficiency

Data gathered during this study give some indication of the probable levels of efficiency in vending by milk distributors and special operators. A thorough comparison would require a great deal more detailed information.

With both types of organizations selling half-pints for 10 cents, specialized operators had slightly lower break-even points for both fully automatic and semiautomatic machines. The differences between organizations were insignificant in view of the fact that not all operators reported. They were 59 to 61 units for fully automatic machines and 37 to 40 units for semiautomatic, for specialized operators and distributors, respectively (Appendix table 4).

Specialized operators sold more units daily per machine, but again the differences were quite small—77 to 75 units for fully automatic and 52 to 51 units for semiautomatic machines, for specialized operators and distributors, respectively.

With both a slightly lower break-even point and somewhat higher average daily volume of sales, the specialized operator had a larger volume from which he might realize net margins. His average sales were 18 units above the break-even point as compared to 14 units for the milk distributor who used fully automatic machines. Similarly, the volumes in excess of break-even points for semiautomatic machines were 15 units and 11 units for specialized operators and milk distributors, respectively.

When third-quarts were vended for 10 cents by both specialized and milk distributing organizations, break-even points for specialized operators were again lower. The volumes needed were 62 to 69 units for fully automatic and 41 to 45 units for semiautomatic machines for the specialized

operators and the distributors, respectively. The advantage in favor of specialized operators was greater for third-quarts than for half-pints.

But, unlike the situation for half-pints, milk distributors' sales averaged higher than those of specialized operators. The daily unit volumes were 94 to 91 for fully automatic machines and 61 to 50 for semiautomatic machines; in each case the larger volume figure was that of the milk distributor.

For fully automatic machines handling third-quarts, the average difference between break-even point and actual sales was 29 units for the specialized operator as compared to 25 units for the distributor. However, in the case of semiautomatic machines, milk distributors had the advantage—16 instead of 9 units.

These figures indicate that specialized operators as a group operate machines more economically than milk distributors, but the differences are not great. The data also show that milk distributors average about as many unit sales as specialized operators. In some cases, of course, they are making more.

The distributors had considerably higher break-even points for third-quarts than for half-pints; 69 to 61 units for fully automatic and 45 to 40 units for semiautomatic machines. Break-even points of specialized operators were about equal for the 2 products—62 to 59 units for fully automatic machines, and 41 to 37 units for semiautomatic.

Another comparison indicates that the average sales volume advantage of specialized operators is due to the fact they have proportionately fewer machines with sales of less than 30 units a day. They also have more machines with sales averaging more than 150 units daily (Appendix table 7).

Differences in operating margins between organizations reflect different operating practices. Some specialized operators use a set percentage markup or margin. For example, one operator reported that he needed 35 percent of the retail price on all products to meet his costs and make a profit. When selling third-quarts and half-pints for 10 cents each, he paid the dairy the same price for each size carton. To the extent that this is practiced the break-even points would be about the same for third-quarts as for half-pints, because the specialized operator would be paying the same price for each size of carton. In contrast, the distributor's product cost varies with the quantity involved.

Greater use of the sliding scale method of paying commissions may help specialized operators avoid low-volume, unsuccessful locations. One-third of these operators, as compared to one-fourth of the milk distributors, used a sliding scale (Appendix table 9).

Specialized operators used department stores as vending locations to a much greater extent than milk distributors. The latter were relatively active in schools, in part probably as a result of a belief that the machines were particularly effective there for brand advertising and promotion of total milk consumption. For further comparisons of this kind see appendix table 11.

In conclusion, experience thus far

This study found military establishments ranked third in popularity as locations for milk-vending machines.

indicates that both milk distributors and specialized operators can succeed or fail in vending milk. As a group, specialized operators appear to have a slight edge over milk distributors. In part, at least, this reflects different objectives which operators seek through vending.

Many rather small distributors may find it desirable to sell packaged milk to organizations specializing in automatic merchandising. Other distributors, particularly large ones, may find it possible to develop their own specialized departments to handle vending sales.

No hard and fast rules can be made to influence decisions by milk distributors, whether they are cooperatives or not. Local conditions vary too greatly.

Most vending machines dispense chocolate as well as plain milk and a number handle buttermilk, too. In large industrial plants, milk products have to compete with other products for customer patronage.

Appendix A—Nature of the Study

This part of the appendix deals with the purpose, methods used, and scope of our study.

Purpose

Farmer Cooperative Service made this study to provide information that will enable managements of dairy cooperatives and others to make economically sound decisions on whether to engage in milk vending. It was also designed to provide guides and standards that will help managements succeed should they decide to engage in this method of merchandising.

In order to keep the study of manageable size we limited it to the most common kind of vending operations rather than studying all variations in equipment and practices.

Methods and Scope

We used a mail questionnaire to obtain information from a maximum number of operators in order to get a broad perspective of the current aspects of vending. In using this method, the study had to be limited both as to the types of vending machine to be studied and the kind of information to be obtained. Consequently, this report considers only the coin-operated small-package indoor machine, the type being used most extensively.

We recognized the importance of the large outdoor machine, coin-operated indoor bulk machine, and the manually operated bulk dispenser. Each of these machines presents somewhat different problems that require separate handling, however, and we could not study all of them.

We did not attempt to measure the effects of vending machine sales on total milk sales within a market, or to determine the costs associated with this method of distribution. Research on these two important questions is being conducted by the Agricultural Marketing Service, U. S. Department of Agriculture.

It was not possible to send a questionnaire to each milk vending machine operator in the United States since no complete list of names and addresses was available. However, by consulting many published and unpublished sources, we prepared a reasonably complete and up-to-date mailing list. We are confident that a high percentage of all large operators received questionnaires.

As used in this report, the term "specialized operators" refers to business concerns that have automatic merchandising as their principal activity. For 15 of every 16 from which reports were received, milk was only one of several items handled. None of these were farmer cooperatives. The term "milk distributors" applies to business concerns that have conventional distribution of milk as their principal activity; vending milk sales usually are a sideline activity. Some of the organizations covered in this report were farmer cooperatives but most were not.

Our mailing list included a total of 295 operators of milk vending machines with 162 "specialized operators" and 133 "milk distributors." Usable questionnaires were received from 96 (59 percent) of the 162

specialized operators. Eighty-six of the 133 milk distributors (64 percent) returned usable questionnaires. Twenty-four of the 86 were cooperatives. Altogether, 182 of the 295 operators (62 percent) returned usable questionnaires.

We presume—but have not attempted to verify this supposition by statistical analysis—that we may have received replies from a greater proportion of the operators who had successful experiences with vending than of the operators with unsuccessful experiences. This may give some bias to our data. However, even if our supposition is correct, we believe this limitation on the validity of the data is not of prime importance and does not prevent reasonable interpretations of the meaning of the data.

The 86 milk distributors responding operated a total of 3,291 small-package indoor machines, while the 96 specialized operators operated 6,195 machines of this type. Together, these concerns furnished information on 9,486 milk vending machines.

Our questionnaires were completed by respondents during August 1955. The National Automatic Merchandising Association (Chicago, Ill.) estimated that there were 16,000 small-package indoor machines in operation at the end of 1954 and 22,000 machines by the end of 1955.

The 9,486 machines reported to us represent approximately 59 percent of the association's estimate for 1954 and about 43 percent of its 1955 estimate. These comparisons indicate that the number of machines reported to us was between 45 and 50 percent of the total number in operation at the time questionnaires were completed. We do not know, of course, how precise are the estimates of the association. In any event, since our study covered nearly 10,000 machines of both large and small operators and both milk distributing organizations and specialized operators, located in 34 different States, we think it provides a reasonably good cross section of milk vending as it exists today.

To supplement information obtained by mail, we conducted field interviews with successful operators in several States. We also reviewed all available literature on the subject to obtain further information on milk vending.

Appendix B—Statistical Tables

Appendix table 1.—Entry into and expansion of milk vending, 1950 through part of 1955, reported by 86 milk distributors and 96 specialized operators, August 1955

Year	Milk distributors [1]			Specialized operators [2]		
	Number of operators starting vending	Average number of machines operated first year	Average number of machines planned by end of 1955	Number of operators starting vending	Average number of machines operated first year	Average number of machines planned by end of 1955
1950	9	5	34	9	39	126
1951	5	9	47	7	10	50
1952	3	22	62	17	4	29
1953	5	18	49	12	5	25
1954	25	14	28	21	20	42
1955 [3]	12	22	32	10	20	33
Total	59	.....	.....	76	.....	.....

[1] Principal activity is conventional distribution of milk; 27 of the 86 began milk vending prior to 1950.
[2] Principal activity is automatic merchandising; 20 of the 96 began milk vending prior to 1950.
[3] Data for 1955 are incomplete.

Appendix table 2.—Regional location and kind of vending machines used by 86 milk distributors and 96 specialized operators, August 1955

Region	Milk distributors [1]			Specialized operators [2]		
	Number of operators	Number of machines		Number of operators	Number of machines	
		Fully automatic	Semi-automatic		Fully automatic	Semi-automatic
New England	6	134	72	9	174	147
Middle Atlantic	32	857	668	18	951	41
East North Central	17	477	220	32	1,996	1,300
West North Central	8	80	323	6	168	248
South Atlantic	11	171	48	13	382	99
West South Central	7	75	83	10	247	131
Mountain	3	47	4	2	66	92
Pacific	2	35	0	6	111	39
United States total	86	1,876	1,418	96	4,095	2,097

[1] Principal activity is conventional distribution of milk.
[2] Principal activity is automatic merchandising.

Appendix table 3.—Indicated increases in number of milk vending machines, 1954 to 1955, August 1955 [1]

Plans for 1955 [2]	All vending machine operators			Milk distributors [3]			Specialized operators [4]		
	Number of operators	Percent of total number	Average number of machines added	Number of operators	Percent of total number	Average number of machines added	Number of operators	Percent of total number	Average number of machines added
Will add machines	118	73.7	21	58	78.4	16	60	69.8	26
Will reduce number of machines	3	1.9	.....	.....	.....	.....	3	3.5	.....
No change	22	13.7	.....	13	17.6	.....	9	10.5	.....
Uncertain	5	3.1	.....	1	1.3	.....	4	4.6	.....
No reply	12	7.6	.....	2	2.7	.....	10	11.6	.....
Total	160	100.0	21	74	100.0	16	86	100.0	26

[1] Operators who started vending in 1955 and the machines they operated are not included in this table.
[2] As of August 1955.
[3] Principal activity is conventional distribution of milk.
[4] Principal activity is automatic merchandising.

Appendix table 4.—Daily volume required for a fully automatic and a semiautomatic machine to break even, actual average daily sales, and amount by which sales exceed the break-even point, reported by operators listing the half-pint or third-quart as their most important unit, August 1955 [1]

Kind of unit and type of organization	Fully automatic machines				Semiautomatic machines			
	Number of operators reporting	Average number of units			Number of operators reporting	Average number of units		
		Machine must sell per operating day to break even	Machines are selling per operating day [2]	Sales exceed break-even point		Machine must sell per operating day to break even	Machines are selling per operating day [2]	Sales exceed break-even point
Half-pint unit:								
Milk distributors	39	61	75	14	17	40	51	11
Specialized operators	39	59	77	18	20	37	52	15
Total or average [2]	78	60	77	17	37	39	51	12
Third-quart unit:								
Milk distributors	15	69	94	25	12	45	61	16
Specialized operators	19	62	91	29	15	41	50	9
Total or average [2]	34	65	92	27	27	43	53	10

[1] The selling price for each unit was 10 cents. [2] Weighted average.

Appendix table 5.—Distribution of unit sales volumes for milk vending machines reported by operators listing the half-pint or third-quart container as their most important unit, August 1955 [1]

Class intervals (in units average machine sells per operating day)	Operators selling half-pints				Operators selling third-quarts			
	Fully automatic machines		Semiautomatic machines		Fully automatic machines		Semiautomatic machines	
	Number of operators reporting	Percent of total number of operators	Number of operators reporting	Percent of total number of operators	Number of operators reporting	Percent of total number of operators	Number of operators reporting	Percent of total number of operators
Less than 30	2	2.6	3	10.0	...	...	...	...
30–39	3	3.8	6	20.0	...	...	4	16.7
40–49	6	7.8	8	26.8	...	...	5	20.7
50–59	5	6.5	7	23.4	...	...	3	12.5
60–69	8	10.4	1	3.3	3	9.7	4	16.7
70–79	14	18.2	1	3.3	3	9.7	4	16.7
80–89	9	11.7	1	3.3	4	12.9	1	4.2
90–99	7	9.1	1	3.3	4	12.9	2	8.3
100–109	12	15.6	1	3.3	7	22.6	1	4.2
110–119	1	1.3	...	...	3	9.7	...	...
120–129	3	3.9	...	...	...	...	...	...
130–139	3	3.9	...	...	1	3.2	...	...
140–149	2	2.6	...	...	1	3.2	...	...
150 and over	2	2.6	1	3.3	5	16.1	...	...
Total	77	100.0	30	100.0	31	100.0	24	100.0

[1] Average unit sales volumes given by operators differed considerably between large and small operators; they were weighted by the number of machines involved to get weighted average daily sales as shown in table 3. Due to lack of complete data needed for weighting, these averages do not include quite all of the operators for whom break-even points are shown in table 6.

Appendix table 6.—Distribution of break-even points for milk vending machines reported by operators listing the half-pint or third-quart container as their most important unit, August 1955 [1]

Units a machine must sell per operating day to break even	Operators selling half-pint				Operators selling third-quart			
	Fully automatic machines		Semiautomatic machines		Fully automatic machines		Semiautomatic machines	
	Number of operators reporting	Percent of total number of operators	Number of operators reporting	Percent of total number of operators	Number of operators reporting	Percent of total number of operators	Number of operators reporting	Percent of total number of operators
Less than 30	2	2.6	6	16.2			3	11.1
30–39	6	7.7	10	27.0	1	2.9	7	25.9
40–49	8	10.3	13	35.2	4	11.8	7	25.9
50–59	18	23.1	4	10.8	10	29.4	6	22.2
60–69	20	25.6	4	10.8	7	20.6	2	7.5
70–79	8	10.3			4	11.8	1	3.7
80–89	9	11.5			2	5.9		
90–99	3	3.8			1	2.9		
100–109	4	5.1			3	8.8	1	3.7
110–119								
120 and over					2	5.9		
Total	78	100.0	37	100.0	34	100.0	27	100.0

[1] The selling price of each unit was 10 cents.

Appendix table 7.—Machines classed by number of units sold per operating day, as reported by 66 milk distributors and 69 specialized operators, August 1955 [1]

Class interval (in number of units machines sell in average operating day)	All vending machine operators		Milk distributors [3]		Specialized operators [4]	
	Number of machines [2]	Percent of total	Number of machines [2]	Percent of total	Number of machines [2]	Percent of total
Less than 30	553	9.56	332	13.35	221	6.71
30–59	1,759	30.41	749	30.12	1,010	30.63
60–89	1,570	27.14	648	26.05	922	27.96
90–119	875	15.13	343	13.80	532	16.14
120–149	578	9.99	246	9.89	332	10.07
150 and over	449	7.77	169	6.79	280	8.49
Total	5,784	100.0	2,487	100.0	3,297	100.0

[1] Forty-seven operators answering mail questionnaires did not give details on their machines' average daily sales.
[2] Includes only machines which were on location more than 30 days.
[3] Principal activity is conventional distribution of milk.
[4] Principal activity is automatic merchandising.

Appendix table 8.—Number of milk vending machines in specified locations, as reported by 174 operators, August 1955

Kinds of locations	Operators		Machines	
	Number	Percent of total	Number	Percent of total
Industrial plants	157	90.2	4,985	67.5
Office buildings	67	38.5	829	11.2
Military establishments	37	21.3	542	7.3
College classrooms	33	18.9	148	2.1
College dormitories	28	16.0	106	1.4
High schools	36	20.7	105	1.4
Grade schools	34	19.5	149	2.1
Transportation terminals	29	16.7	127	1.7
Department stores	21	12.1	354	4.8
Hospitals	25	14.4	36	.5
Total			7,381	100.0

Appendix table 9.—Commissions paid to location owners by vending machine operators, August 1955

Rate of commission as percent of gross sales	Milk distributors [1]		Specialized operators [2]	
	Number of operators reporting	Percent of total number reporting	Number of operators reporting	Percent of total number reporting
None	1	1.2	5	5.9
Fixed percentage:				
0.1–4.9	3	3.8	1	1.2
5	13	16.3	14	16.7
5.1–9.9	2	2.5	4	4.8
10	36	45.0	29	34.5
10.1–14.9	1	1.2	1	1.2
15	0	.	0	.
More than 15	3	3.8	1	1.2
Sliding scale	20	25.0	29	34.5
Monthly rent	1	1.2	0	.
Total	80	100.0	84	100.0

[1] Principal activity is conventional distribution of milk.
[2] Principal activity is automatic merchandising.

Appendix table 10.—Size of carton and selling price of milk sold from vending machines, August 1955

Size of carton	Price per carton	Number of operators reporting	Percent of operators
	Cents		
Half-pint	10	102	57.5
Half-pint	6	4	2.6
Half-pint	5	1	.4
Half-pint	12	1	.4
Third-quart	10	47	26.6
Pint	15	16	9.0
Pint	12	1	.4
Pint	10	1	.4
10-ounce	10	4	2.6
Total	.	177	100.0

Appendix table 11.—Numbers of operators who had fully automatic and semiautomatic milk vending machines in specified kinds of locations, as reported by 86 milk distributors and 96 specialized operators, August 1955

Kind of location	Milk distributors [1]					Specialized operators [2]				
	Number of operators reporting machines			Total number of machines		Number of operators reporting machines			Total number of machines	
	All fully automatic	All semi-automatic	Some of each	Fully automatic	Semi-automatic	All fully automatic	All semi-automatic	Some of each	Fully automatic	Semi-automatic
Industrial plants	35	18	23	1,088	742	39	9	31	2,043	1,085
Office buildings	20	14	3	128	72	18	5	6	504	125
Military establishments	13	2	1	185	18	14	3	3	307	32
College classrooms	10	4	1	58	20	13	3	2	53	17
College dormitories	8	3	1	55	3	11	3	1	41	7
High schools	10	8	1	36	35	11	4	1	21	13
Grade schools	13	10	2	58	59	2	4	2	15	17
Transportation terminals	7	9	3	37	33	6	3	0	22	35
Department stores	5	5	0	8	10	6	1	3	204	132
Hospitals	11	1	0	14	1	11	2	1	15	6
Total	.....	.....	.....	1,667	993	.....	.....	.....	3,225	1,469

[1] Principal activity is conventional distribution of milk.
[2] Principal activity is automatic merchandising.

Selected References

Brown, E. L., Evans, C. D., and Todd, B. J.
1955. Automatic Merchandising of Fluid Milk Products. South Carolina Agricultural Experiment Station A. E. 111, 20 pp. Clemson, S. C.

Cook, Hugh L.
1951. A Business Analysis of Milk Vending Operations. Wisconsin Agricultural Experiment Station Research Bulletin 174, 53 pp. Madison, Wis.

Marshall, Martin V.
1954. Automatic Merchandising. Harvard University, Division of Research, Graduate School of Business Administration, 275 pp. Boston, Mass.

Metzger, Homer B.
1954. Selling Milk by Automatic Vendor. Maine Agricultural Experiment Station Bulletin 528, 18 pp. Orono, Maine.

Morris, A. J., and Hopson, Gordon
1954. Selling Milk Through Milk Dispensers in the Intermountain Area. Utah State Agricultural College, Mimeo. Summary Report, 5 pp. Logan, Utah.

Omdahl, Sverre N. and McMinimee, W. C.
1955. Mechanical Milk Man. Washington State Department of Agriculture, Division of Markets, Mimeo. Report, 23 pp. Yakima, Wash.

Padgett, Jerry H.
1955. An Analysis of Milk Vendor Operations in South Carolina. South Carolina Agricultural Experiment Station Circular 100, 15 pp. Clemson, S. C.

Ramstad, P. E., Holland, R. F., Wilhelmy, Jr., Maynard, L. A.
1951. Automatic Merchandising Increases Milk Consumption. Cornell University School of Nutrition, 26 pp. Ithaca, N. Y.

Schreiber, G. R.
1954. Automatic Selling. 195 pp. John Wiley and Sons, New York, N. Y.

Other Publications Available

Dairy Cooperatives Help Find Markets, FCS Bulletin 1, Reprint 2. *Donald E. Hirsch.*

Selecting a Program for Butterfat Sampling, FCS Circular 11. *Homer J. Preston.*

Comparing Bulk and Can Milk Hauling Costs, FCS Circular 14. *Joseph M. Cowden.*

Organizing a Farmer Cooperative, FCS Circular 18.

Pricing Milk According to Use, FCS Bulletin 6. *Stanley Krause.*

Meeting Seasonal Problems of Dairy Cooperatives Through Education, FCS Bulletin 9. *Stanley Krause.*

Estimating the "Market Value" of a Milk Distributing Business, April 1954, FCS General Report 3. *Donald E. Hirsch.*

Employee Incentive Payment Plans in Industry, FCS General Report 12. *Nelda Griffin.*

Selecting and Electing Directors of Farmer Cooperatives, FCS General Report 14. *Nelda Griffin, H. N. Weigandt, and K. B. Gardner.*

Milk Distribution Costs of Georgia Cooperatives, FCS General Report 16. *Donald E. Hirsch.*

Selling Milk . . . Ideas for Cooperative Managements, FCS General Report 20, *Donald E. Hirsch.*

Copies of these publications may be obtained upon request while a supply is available from—

INFORMATION DIVISION
FARMER COOPERATIVE SERVICE
U. S. DEPARTMENT OF AGRICULTURE
WASHINGTON 25, D. C.